

ESTABLISHING GENERATIVE YES/NO RESPONSES IN DEVELOPMENTALLY DISABLED CHILDREN

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We evaluated the effects of two procedures for teaching four developmentally disabled children to respond yes/no appropriately. During baseline, tutoring was conducted in which five known items were individually presented with the question, "Is this a ____?", followed either by access to requested items or by remedial prompting contingent on responding. When tutoring did not improve performance, instruction was embedded in the regular classroom activities. In this condition, items requested by students were either presented or withheld on the basis of their response to the question, "Do you want ____?". Increases in correct responding were confirmed by a multiple-baseline design across all four students and were maintained with the introduction of new items. However, generalization to "Is this a ____?" questions did not occur in the tutoring setting until specifically programmed. Subsequently, students also demonstrated appropriate yes/no responding to questions involving actions, possession, and spatial relations.

DESCRIPTORS: yes/no responses, language training, embedded instruction, generalization

The success of operant language instruction with autistic and retarded children has been well established (see Goetz, Schuler, & Sailor, 1979; Harris, 1975; Lovaas & Newsom, 1976 for reviews). Until recently, however, research has focused on the acquisition of grammatical structures (cf. Guess, Sailor, Rutherford, & Baer, 1968; Sailor, 1971; Schumacher & Sherman, 1970; Twardosz & Baer, 1973; Wheeler & Sulzer, 1970), rather than on adapting functional responses to novel situations. Thus, the essential problems of generalization and relevance have been identified as formidable chal-

lenges to behavioral analyses of language (Carr, 1982a; Schuler & Goetz, 1981). Schreibman and Carr (1978), for example, taught autistic children an appropriate, generalized "I don't know" response that decreased the students' nonfunctional, echolalic speech and set the occasion for instructional gains.

The ability to respond "yes" or "no" appropriately is a basic language skill (Carr, 1982b). As a response to the question, "Do you want ____?", "yes" or "no" provides a simple way for children to control their environments. These responses may be especially useful for children who have limited expressive repertoires. "Yes" or "no" is a minimal response that can provide unlimited information to the questioner. Numerous studies have reported the emergence of negation forms in young children (Bloom, 1970; Bloom, Lightbown, & Hood, 1975; DeBoysen-Bardies, 1976; de Villiers & Tager-Flusberg, 1975; Leonard, 1976; Steffenson, 1977), but there have been few reports of procedures for teaching "yes/no" to developmentally disabled students. Hung (1980) used modeling and reinforcement to teach two autistic children to respond "yes" and "no" to the question, "Do you want

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(food item)?” Although the procedure appeared promising, the design of the study did not support the functional relationship of correct responses to the intervention. Further, yes/no responses were trained and assessed only with food, and their function in other important contexts was not evaluated.

Carr (1982b) and Lovaas (1977) suggested similar strategies for teaching autistic children yes/no responses to convey “personal feelings” or preferences. They also described a procedure to teach yes/no for object identification or “factual matters” so the child “can begin to affirm or deny the truth of statements about real objects and events around him” (Lovaas, 1977, p. 159). They did not, however, present data to document the effectiveness of their yes/no training procedures.

The yes/no training procedures described by Carr (1982b), Hung (1980), and Lovaas (1977) are similar to many language training programs for handicapped learners. Typically, the trainer presents discrete trials in a distraction-free, tutoring, setting (Guess, Sailor, & Baer, 1976, 1978; Kent, 1974; Miller & Yoder, 1974). These conditions are often recommended so trainers can conduct intensive instruction (multiple trials) within a brief time.

To promote language in everyday settings, various teaching procedures have been proposed. Although the procedures differ (see Halle, 1982 for a review), the mand-model technique (Rogers-Warren & Warren, 1980), incidental teaching (Hart & Risley, 1968, 1975, 1980), delay (Halle, Baer, & Spradlin, 1981; Halle, Marshall, & Spradlin, 1979), and “loose training” (Campbell & Stremel-Campbell, 1982) all have features in common. Each involves arranging the environment to set the occasion for language; the adult prompts a specific language form or function; and natural consequences for correct responding are provided by delivering the item or event requested. In this way, the trainer uses naturally occurring opportunities to teach verbal operants. These teaching techniques have been effective in increasing spontaneous use of adjective-noun combinations (Hart & Risley, 1968) and compound sentences (Hart

& Risley, 1974) with disadvantaged preschool children; mands for food trays (Halle *et al.*, 1979) and other events or materials (Halle *et al.*, 1981) with severely and moderately retarded children; and receptive language skills of autistic youth (McGee, Krantz, Mason, & McClannahan, 1983). Our study was designed to evaluate the effects of such training on the acquisition of yes/no responses with developmentally disabled, severely language disordered students.

METHOD

Students and Setting

One female and three male students, ranging in age from 4 to 6 years ($M = 5$), enrolled in a special education program for autistic children participated in the study. Two students had been diagnosed in accordance with the criterion established by the National Society for Autistic Children (Ritvo & Freeman, 1978). The other two students were diagnosed as severely developmentally delayed and exhibited many “autistic-like” behaviors. All displayed stereotypy (e.g., rocking, spinning objects, flapping hands), tantrums, inappropriate social behaviors, and deficits in language and communication (e.g., echolalia). An IQ score for Student 3 was estimated at 46 as measured on the Stanford-Binet. On standardized assessments, the students’ mental ages were 2.3, 3.0, 3.0, and 2.5 years. Each student was able to follow basic instructions and name common objects and actions; however, all had been identified by school personnel as failing to demonstrate an appropriate use of “yes” and “no.” In addition, the teacher reported that this particular deficit was hampering the students’ progress in language, reading, and math curricula (i.e., Distar), all of which require frequent yes/no responses. The students’ speech and language therapist reported that they demonstrated other, less complex forms of negation and that acquisition of yes/no was a part of their Individualized Education Plan (IEP). Participants were selected on the basis of teacher referral.

The study was conducted in the students’ classroom, which was 7.4 m \times 9.2 m, contained sev-

eral desks, tables, and chairs, screen partitions to designate learning areas, a play area with shelves of toys, and a sink and bathroom in opposite corners. One teacher and two aides served six students. The daily routine consisted primarily of small group instruction in language, reading, math, fine motor, and self-care skills. During these periods, students could earn tokens for correct performance and appropriate behavior. The tokens could be exchanged later for preferred items or activities. Instructional sessions (20 min long) were separated by 5 min of free time, during which appropriate social behaviors were emphasized. Experimental sessions ranged in length from 5 to 40 min and occurred 5 days per week.

Experimental Conditions

The two training procedures examined in this study varied in setting (tutoring vs. embedded instruction) and type of question presented ("Is this a ____?" vs. "Do you want ____?"). In tutoring, the yes/no response to "Is this a ____?" was multiply controlled by a question and an object (an intraverbal and a tact, Skinner, 1957). Embedded instruction is similar to "incidental teaching" and other "natural environment" instructional strategies (Halle, 1982) and to what has been described as mand training (Hung, 1980; Simic & Bucher, 1980). The yes/no response in this condition was multiply controlled by a question ("Do you want ____?") and a characteristic consequence (an intraverbal and a mand, Skinner, 1957).

Tutoring. Tutoring was conducted at a table in one corner of the classroom. The teacher began each trial by asking the student to select a toy or edible to "work for"—happy face sticker, piece of popcorn, windup car, cracker, or sip of juice. Students received training in responding yes/no appropriately to the question "Is this a ____?" with five items—fork, crayon, cup, block, and scissors—all of which they were able to label correctly. The teacher held up one of the items, asked the student to label it, and, following a correct response, asked either a "yes" or a "no" question. If the item was a fork, for example, the teacher might ask "Is this a cup?" for a "no" question,

and "Is this a fork?" for a "yes" question. Correct responses to either question were followed by descriptive praise and delivery of the toy or edible selected by the student. Following incorrect responses, the teacher modeled the correct response and repeated the question until the student responded correctly. The student was then praised, and the next trial began. Each session consisted of 10 trials, not counting remedial trials (one "yes" and one "no" question for each of the five items). Because Student 4 tended to respond "yes" to every question, he received only "no" trials in an effort to establish this response.

Embedded instruction probes. Probes were conducted in the classroom concurrent with the tutoring condition. When Student 4 requested an item, the teacher would ask either a "yes" or a "no" question ("Do you want ____?"), and deliver the requested item regardless of whether or not he responded correctly. This condition was implemented only with Student 4 because the teacher thought that this procedure hampered learning.

Embedded instruction. This training occurred throughout the school day, during regular classroom activities. Typically, 5–15 training trials occurred per student per day. Each was initiated by a student's request (e.g., asking for, reaching for, or pointing to) one of the items the student had selected during the tutoring conditions, as well as several other items. Usually, these requests occurred prior to a free-time period, or after the student had accumulated a number of tokens during instructional sessions and wished to exchange them. Following the request, the teacher asked a "yes" or a "no" question. The order of the questions was random to the extent that five "yes" and five "no" questions were asked within a block of 10 trials. During embedded instruction, the form of the question asked was, "Do you want ____?"

For a "yes" question, the teacher asked, "Do you want (requested item)?" "Yes" responses were followed by descriptive praise and delivery of the requested item. Following "no" responses, the teacher withheld the requested item, saying "No, you don't want it? O.K., I'll ask again later." After approximately 1 min, the teacher repeated

the question and prompted the appropriate response, and then delivered the item.

For a "no" question, the teacher asked, "Do you want ____?", indicating a nonpreferred item (teaspoon of cornmeal, baking soda, or a sip of salt water). "No" responses were followed by descriptive praise ["That's right. You asked for (requested item)."] and delivery of the requested item. Following "yes" responses, the teacher offered the nonpreferred item instead of the one initially requested. If the student refused the item (turning his or her head or pushing the item away) or after accepting it (which rarely occurred after the first trial), the teacher repeated the question and prompted the correct response (e.g., "Did you want cornmeal? No.").

When embedded instruction produced accurate responding to the first set of items, and performance was stable on tutoring probes (described next), trials were conducted using a new set of items. The new items were selected individually for each student, based on the teacher's observations of demonstrated preference. This procedure was conducted to determine if the yes/no responses were specific to the first set of items and to determine the amount of additional training needed to produce appropriate responding to new items.

Tutoring probes. For each set of 10 trials with "Do you want ____?" questions during the embedded instruction condition, a probe was conducted to assess the appropriate use of yes/no responses to "Is this a ____?" questions, under the tutoring condition. Trials were conducted in the same manner as during the tutoring condition, except no contingencies were in effect for correct responding, and praise was provided only for being on task.

Generalization programming. Following embedded instruction, an effort was made to promote generalization of yes/no responses to "Is this a ____?" questions in the tutoring setting. All students first received embedded instruction. When a student requested one of the previously trained items, the teacher asked, "Is this a ____?", instead of "Do you want ____?" Correct responses were followed by descriptive praise and delivery of the

requested item. Incorrect responses were followed by a remedial trial.

Students 1 and 4 subsequently received embedded instruction during which requests for items were alternately followed by "Is this a ____?" and "Do you want ____?" questions. Tutoring probes continued.

Generalization probes. Probes were conducted to assess generalization of yes/no responding to questions involving other stimulus categories that the students were able to identify accurately: action and possession, Students 1–4; and spatial relations, Students 1 and 3. (Probe sessions were repeated for Student 1 because she appeared to be distracted by an ongoing activity during the first set of probes.) No contingencies were in effect for yes/no responses to probe questions, although students were praised for paying attention.

For action questions, each student was asked 15 "yes" and 15 "no" questions from *Distar Language 1* (Engelmann & Osborn, 1976). The student was first asked to label the action portrayed in the lesson (e.g., "What is the boy doing?"). Following a correct response, the student was praised, and then asked, "Is the boy (sleeping, eating, jumping)?", specifying the action portrayed for a "yes" question, and another action for a "no" question. Trials were conducted similarly for questions relating to actions performed by the student when the teacher instructed the student to "stand up," "sit down," or "touch your nose."

Possession questions (five "yes" and five "no") were posed to all four students about ownership of items. For example, the teacher presented a jacket which belonged to the student or a classmate and asked the student to identify its owner. Following a correct response, the student was praised and asked either if the item was his or hers or if it belonged to another student.

Data Collection and Reliability

For each tutoring session or block of 10 embedded instruction trials, the teacher scored whether a "yes" or a "no" question was asked, the item referenced, and whether a correct response occurred. During the generalization programming condition, each trial was also scored as a "Do you

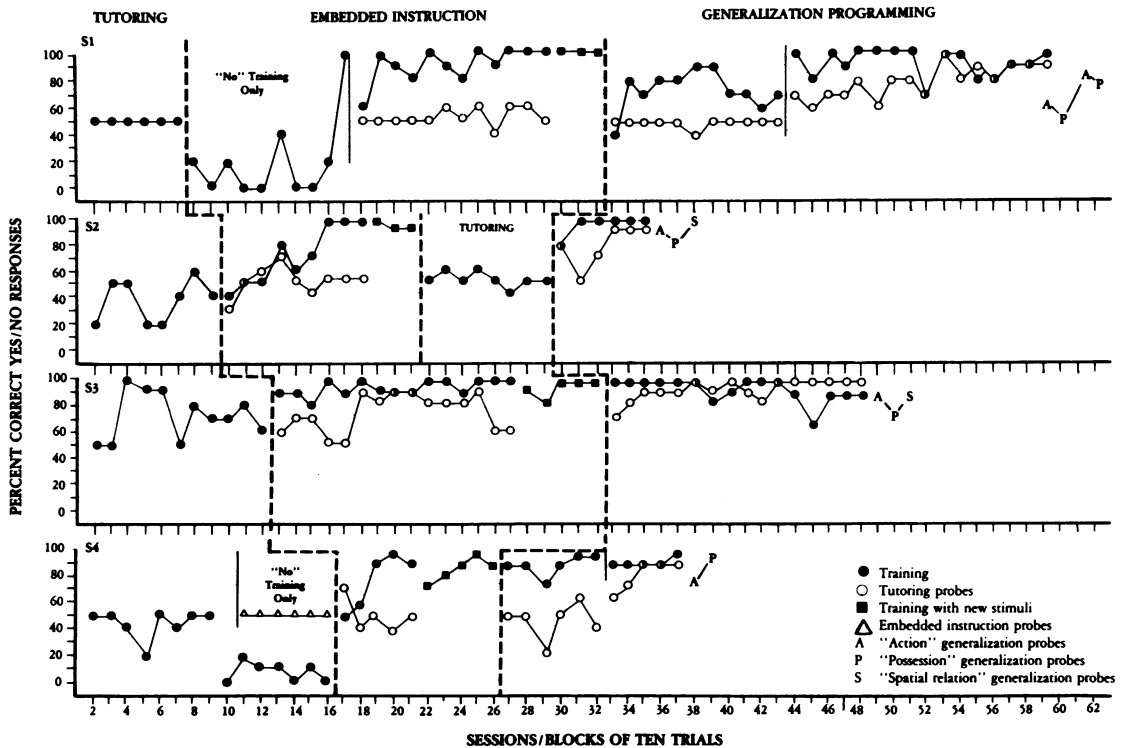


Figure 1. Percent correct yes/no responses during training (●) and probe (○) sessions for Students 1–4 across experimental conditions. △ for Student 4 represent a baseline phase in which access to item was provided irrespective of correct responding under embedded instruction condition. ■ indicate performance during embedded instruction with new stimuli. A, P, and S represent generalization probe data for yes/no action, possession, and spatial relation questions, respectively. Data are plotted across blocks of 10 trials (5 yes, 5 no) that occurred within each session during tutoring and generalization probes, and throughout the school day during embedded instruction and generalization programming conditions.

want ____?" ("mand") or a "Is this a ____?" ("tact") question. A correct response was defined as a vocal "yes" ("no") response to a "yes" ("no") question. Any other response, or no response, was scored as incorrect.

Reliability was measured by an independent observer on 20% of training and probe sessions/trials for each student and in every condition. During embedded instruction, reliability checks were typically conducted once or twice a day, at various times, for periods of 15–30 min by the observer positioned approximately 3–4 ft from the teacher.

During embedded instruction, the teacher delayed delivery of consequences for several seconds following each trial until the reliability observer had scored the response, in an effort to avoid observer bias. Observers' records were compared trial by trial. All reliability checks yielded 100% agreement.

Experimental Design

The experimental design followed the general form of a multiple-baseline across students (Baer, Wolf, & Risley, 1968) with individual variations.

RESULTS

Figure 1 shows the percentage of correct yes/no responses for each student across experimental conditions. The percent correct responses during tutoring for Students 2 and 3 varied inconsistently, whereas Students 1 and 4 typically perseverated with a "yes" response, resulting in half the trials scored as correct. Subsequent attempts to establish a "no" response in Student 4's repertoire by presenting only "no" trials during tutoring failed to increase correct responding ($M = 7.1\%$). Little change was observed in Student 4's performance during classroom probes when noncontingent re-

inforcement was provided for yes/no responses to "Do you want ____?" questions. He continued to respond "yes," with a mean of 50% correct.

When embedded instruction was sequentially implemented, performance improved for all four students. The mean percent correct responses for Students 1–4, respectively, was 90.8%, 72.2%, 94.0%, and 78.8%. The number of sessions (blocks of 10 trials) required to reach criterion ranged from 5 to 15 ($M = 10.3$). When Student 1 was first presented with only "no" trials in the embedded instruction condition, a previously absent "no" response was established in her repertoire at 100% correct within 10 sessions.

All four students demonstrated continued high levels of correct responding with new items ($M = 100\%$, 93.3%, 94.0%, and 86.0%). The percent correct yes/no responses to "Is this a ____?" questions on tutoring probes during the embedded instruction condition, however, showed little change ($M = 52.5\%$, 50.0%, 66.7%, and 50.0%). Student 2 subsequently received tutoring for yes/no responses with little effect.

Increases in correct responding on probes were obtained during generalization programming for all four students. High levels of correct responding during training were recovered from the previous tutoring conditions for Student 2 ($M = 96.7\%$) and maintained from the previous embedded instruction condition for Student 3 ($M = 93.8\%$).

Student 4 also maintained a high percentage of correct responses during training in this condition ($M = 90.0\%$), but Student 1's performance decreased somewhat ($M = 72.7\%$). Little change occurred for either of these students, however, during tutoring probes ($M = 49.1\%$ and 45.0% for Students 1 and 4, respectively). Further attempts to program for generalization during the generalization condition led to criterion probe performance for both these students ($M = 78.8\%$ and 80.0%). Training performance recovered for Student 1 ($M = 92.5\%$) and was maintained at a high level for Student 4 ($M = 92.0\%$).

In addition, all four students demonstrated high levels of correct yes/no responding on generalization probes to questions involving actions and pos-

session, and for Students 2 and 3, also to spatial relations. Percent correct responses on final probes ranged from 73.3% to 93.3%, 70.0% to 90.0%, and 90.0% to 100% for action, possession, and spatial relation questions, respectively.

DISCUSSION

The results of our study indicate that developmentally disabled children acquired appropriate yes/no responding in embedded instruction, but none of them acquired appropriate yes/no responding under tutoring conditions. With the successive introduction of embedded instruction, however, all four students quickly learned to respond "yes" or "no" consistent with their preceding selection of preferred items. Students' performances during the initial sessions of this condition, and Student 4's data during classroom probes, indicate that the nature of the question per se did not control correct responding prior to embedded instruction. In addition, the students' subsequent maintenance of correct responding to new items indicates that their responses were not specific to a particular set of stimuli. Generalization of appropriate yes/no responses to "Is this a ____?" questions during tutoring probes occurred only when they were specifically programmed by alternating those questions with "Do you want ____?" questions.

The results of probes to assess yes/no responding with respect to action, possession, and spatial relation questions indicate that, to some extent, generalization occurred across other stimulus categories as well. Consistent with teacher reports following completion of the study, these findings suggest that the students acquired a yes/no "concept." The students continued to demonstrate appropriate usage of yes/no in a variety of contexts during daily classroom activities, and they were able to participate effectively in Distar math, reading, and language programs, which often require such responses.

These findings support and extend those of previous research in several ways. First, these results demonstrate the effectiveness of classroom teaching of other types of verbal operants with a different

population (cf. Hart & Risley, 1968, 1975, 1980). Second, although few direct comparisons have been conducted, our data support other investigators' observations that these procedures may provide a more powerful teaching paradigm in situations in which highly structured training (tutoring) has proven minimally effective (Koegel & O'Dell, 1982; McGee et al., 1983). Third, they replicate results of previous investigations indicating that classroom training (embedded instruction) procedures may promote generalization across settings, including during highly structured sessions (McGee et al., 1983). In addition, in this study, we address the parameters of generalization across language functions.

Several factors may have contributed to the relative effectiveness of embedded instruction. One possibility involves the consequences for correct/incorrect responding. A number of authors have recommended targeting behaviors that are likely to produce appropriate natural consequences in order to promote correct responding and generalization (Bloom & Lahey, 1978; Saunders & Sailor, 1979; Spradlin & Siegel, 1982; Williams, Koegel, & Egel, 1981). Only during the embedded instruction condition were students' responses followed by a characteristic consequence.

The effectiveness of the embedded instruction condition could have been influenced by the fact that the training strategy incorporated a distributed trial/task sequence, as opposed to massed trial presentation, during tutoring. Researchers comparing task presentation sequences have previously demonstrated that acquisition is enhanced when a distributed task/trial sequence is used (Mulligan, Guess, Holvoet, & Brown, 1980).

In addition to enhancing acquisition, embedded instruction has the advantage of being convenient to implement. The teacher reported that this procedure was easily accommodated within the regularly scheduled routine and did not involve excessive demands on her time or available resources. Thus, embedded instruction appears to be an effective, economical, and practical means of establishing appropriate yes/no responding in severely language disordered children.

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